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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/086,505	02/28/2002	Rama R. Goruganthu	AMDA.521PA	2145
7590	04/21/2004		EXAMINER	
Crawford PLLC Suite 390 1270 Northland Drive St. Paul, MN 55120			GEYER, SCOTT B	
			ART UNIT	PAPER NUMBER
			2829	

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/086,505	Applicant(s) GORUGANTHU ET AL.	
	Examiner Scott B. Geyer	Art Unit 2829	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 21-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 and 28-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>0602</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of claims 1-20 and 28-30 in Paper No. 0104 is acknowledged. The traversal is on the ground(s) that: (1) the claims of Group I read on the claims of Group II, (2) the restriction is illogical, and that (3) the office action argues in a conclusory manner with no rationale in support of the stated conclusion. This is not found persuasive because:

(1) the species groups I and II are drawn to two patentably distinct methods, as was gleaned from the applicant's disclosure. The species restriction is based on context, not on claim identification, and it is the applicant's obligation (as clearly stated in the restriction action) to identify which claims read on which species, after electing a single species - - see MPEP 809.02(a);

(2) the examiner does not deem the restriction as illogical since the species have been clearly identified based upon what has been disclosed by the applicant in the applicant's disclosure - - again see MPEP 809.02(a);

(3) the office action did not "argue in a conclusory manner"; the office action merely presented a restriction to the applicant based upon the species present in the applicant's disclosure, and the applicant was obligated to elect one species for prosecution and designate which pending claims read on that elected species.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 21-27 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or

linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 0104.

Information Disclosure Statement

3. The information disclosure statement filed 6-5-2002 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Drawings

4. The drawings submitted on May 7, 2002 are acceptable.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 15, 18-20 and 30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6A. As to **claim 15**: line 3 recites "*without necessarily* stimulating circuitry adjacent to the selected node". It is unclear to the examiner as to whether the circuitry adjacent the selected is supposed to be stimulated or not. For purposes of examination, the examiner will assume that the circuitry adjacent the probed circuitry is

not stimulated. Furthermore, the claim recites a probe tip with a radius that is "sufficiently small". However, neither the claim nor the specification recite where along the probe tip the radius is measured. Also, the drawings depict a probe tip with a conical shape, thereby disclosing a probe tip with a varying radius, dependent upon where it is measured. For purposes of examination, a "sufficiently small" radius is a radius of 50 nanometers (as described in the specification on page 7) or less, and the radius is measured at the end of the probe tip.

6B. As to **claim 18**, the applicant recites using the detected electrical characteristic to provide a "modified die design" and making a device using the "modified die design". However, the examiner is confused as to how the die design is to be modified, since neither the claim nor the specification recite specifics or particulars as to the modification. This claim has not been treated further on its merits.

6C. As to **claim 19**, the applicant recites a device manufactured "using the modified die design" of claim 18. This product-by-process claim is also confusing to the examiner since the die design has not been explained, nor has the "modification" been shown or explained. This claim has not been treated further on its merits.

6D. As to **claim 20**, the applicant recites "using the detected electrical characteristic to *modify* a manufacturing process for the die" and then using the "*modified* manufacturing process" to make additional dies. However, the examiner is confused as to how the die design is to be modified, since neither the claim nor the specification recite specifics or particulars as to the modification. This claim has not been treated further on its merits.

6E. As to **claim 30**: lines 2-3 recite "*without necessarily* stimulating circuitry adjacent to the selected node". It is unclear to the examiner as to whether the circuitry adjacent the selected is supposed to be stimulated or not. For purposes of examination, the examiner will assume that the circuitry adjacent the probed circuitry is not stimulated. Furthermore, the claim recites a probe tip with a radius that is "sufficiently small". However, neither the claim nor the specification recite where along the probe tip the radius is measured. Also, the drawings depict a probe tip with a conical shape, thereby disclosing a probe tip with a varying radius, dependent upon where it is measured. For purposes of examination, a "sufficiently small" radius is a radius of 50 nanometers (as described in the specification on page 7) or less, and the radius is measured at the end of the probe tip.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-17 and 28-30 are rejected under 35 U.S.C. 102(e) as being anticipated by Birdsley et al. (6,448,096).

The applied reference has a common assignee with the instant application.

Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

8A. As to **claim 1**, Birdsley et al. teach a method of analyzing a semiconductor die (see column 2, line 63 to column 6, line 53). An electric field is applied to the die using a "voltage application tool" (i.e. an atomic force microscope, AFM) *separate* from the die and circuitry of the die is stimulated, a response is detected and the response is used to detect an electrical characteristic of the die (see also column 4, lines 9-28).

8B. As to **claim 2**, Birdsley et al. teach a passivation (i.e. insulation) layer (130) in figure 1.

8C. As to **claim 3**, Birdsley et al. teach AFM on a backside of flip-chip die (see column 3, lines 24).

8D. As to **claim 4**, Birdsley et al. teach AFM on a thinned backside of flip-chip die (see column 3, lines 24).

8E. As to **claim 5**, Birdsley et al. teach AFM on a thinned backside of flip-chip die, and therefore teach thinning of a backside of a flip-chip die (see column 3, lines 24).

8F. As to **claim 6**, Birdsley et al. teach applying an electric field, via the AFM via an insulator portion of a silicon-on-insulator (SOI) (see column 2, lines 6-39).

8G. As to **claim 7**, Birdsley et al. teach a thinned back portion of the SOI, and the application of voltage, via the AFM, is done through the thinned backside (see column 3, lines 9 et seq.).

8H. As to **claim 8**, Birdsley et al. teach utilizing an AFM (atomic force microscope) (see column 2, lines 6-39).

8J. As to **claim 9**, Birdsley et al. teach positioning the tip (cantilever) of the AFM over circuitry and applying voltage to the tip, with a laser (see column 3, lines 25-54).

8K. As to **claim 10**, Birdsley et al. teach varying the voltage of the probe tip (cantilever) over time, i.e. oscillation (see column 4, lines 50 et seq.).

8L. As to **claim 11**, Birdsley et al. teach detecting a response from the die by detecting a position of the probe tip over the die and mapping the response to circuitry in the die below the probe tip - - i.e. the probe tip is scanned across the surface of the die to determine the topography (mapping) and then the cantilever probe tip is again scanned across the die to detect responses (deflections of the probe tip) and the deflection is detected and used to detect an electrical characteristic of the die (column 3, lines 55-67).

8M. As to **claim 12**, Birdsley et al. teach scanning the cantilever probe tip over the die (determining topography) (see column 3, lines 5 et seq.).

8N. As to **claim 13**, Birdsley et al. teach a SOI die having circuitry (column 2, lines 6-39) and the circuitry including transistors (column 4, lines 35-37). It is inherent from the disclosure of Birdsley et al. that the SOI die has two or more circuits (i.e. a plurality of circuits).

8P. As to **claim 14**, Birdsley et al. teach applying a periodic voltage (i.e. oscillation) to an AFM cantilever probe tip (column 4, lines 50 et seq.) and the voltage is relative to a voltage of a reference node in the die (see also figure 3).

8Q. As to **claim 15**, Birdsley et al. teach an AFM probe tip used to stimulate only a particular circuit (column 3, lines 9-24). Furthermore, since Birdsley et al. disclose an AFM, it is inherent that the tip radius of the probe tip be less than 50 nanometers.

8R. As to **claim 16**, Birdsley et al. teach positioning a probe tip on a nanometer (i.e. atomic) scale since Birdsley et al. teach AFM (*atomic* force microscopy).

8S. As to **claim 17**, Birdsley et al. teach AFM scanning through an opaque layer (130) in figure 1, and the circuitry (142, 144, 146) is buried beneath the layer.

8T. As to **claim 28**, Birdsley et al. teach a system for analyzing a semiconductor die, wherein the die has circuitry in a circuit side opposite a backside (see column 2, lines 6-39). The system for analyzing includes a means separate from the die for applying voltage (an AFM cantilever probe tip), a means for detecting a response to the applied electric field, and a means for using the response to detect an electrical characteristic of the die (see also column 2, lines 29-34).

8U. As to **claim 29**, Birdsley et al. teach a system for analyzing a semiconductor die, wherein the die has circuitry in a circuit side opposite a backside (see column 2, lines 6-39). The system for analyzing includes an AFM cantilever probe tip, separate from the die for applying voltage for stimulating the circuitry. Although "electrical detection circuitry" is not specifically recited by Birdsley et al., it is inherent in Birdsley et al. since Birdsley et al. do specifically teach an atomic force microscope used to detect

a response from the die. Also, although Birdsley et al. do not specifically recite "a computer arrangement" adapted for utilizing the response to detect an electrical characteristic for the die, Birdsley et al. do teach an atomic force microscope (column 2, lines 6-39) and also teach a controller adapted for use with the AFM (column 6, lines 35 et seq.), so Birdsley et al. inherently teach a "computer arrangement" for detecting an electrical characteristic of the die, since computers are utilized to operate atomic force microscopes.

8V. As to **claim 30**, Birdsley et al. teach an AFM probe tip used to stimulate only a particular circuit (column 3, lines 9-24). Furthermore, since Birdsley et al. disclose an AFM, it is inherent that the tip radius of the probe tip be less than 50 nanometers.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Ishii et al. (5,493,236).

9A. As to **claim 1**, Ishii et al. teach analyzing a semiconductor device. An electric field is applied to the die using a "voltage application tool", i.e. a laser. A response is detected from the die and using the response to detect a electrical characteristic of the die (e.g. detecting a defect) (see column 3, lines 35-60 and also figure 1).

9B. As to **claim 28**, Ishii et al. teach analyzing a semiconductor device. Ishii et al. teach means for applying an electric field to the die, and separate from the die, i.e. a

laser. Ishii et al. also teach means for detecting a response from the die and detecting an electrical characteristic of the die (e.g. detecting a defect) (see column 3, lines 35-60 and also figure 1).

10. The following references are cited as being particular relevant to the applicant's invention: Birdsley et al. (6,417,680 B1), Friedman et al. (6,412,086 B1) and White (6,686,755 B2).

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott B. Geyer whose telephone number is (571) 272-1958. The examiner can normally be reached on weekdays, between 10:00am - 6:30pm. E-mail: scott.geyer@uspto.gov

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SBG 4/9/04

SBG
April 9, 2004

Ernest J. Karlson
ERNEST KARLSEN
PRIMARY EXAMINER